

(6.4) Solving Quadratic Equations Using a Formula**What we know:**How to find the roots of a quadratic relation by **FACTORING**

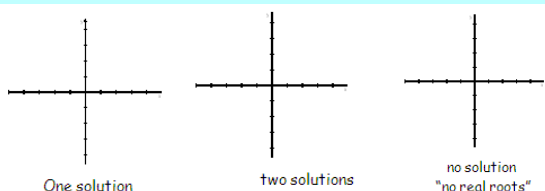
Students will be learning;

To **SOLVE** quadratics that can **NOT** be factored

Feb 22-11:43 AM

Solving Quadratic Equations**Factored Form**Set each factor equal to zero.
Solve for the variable.**Standard Form**Factor.
Set each factor equal to zero.
Solve for the variable.**Vertex Form**Convert to standard form & factor.
OR
Solve by formula.

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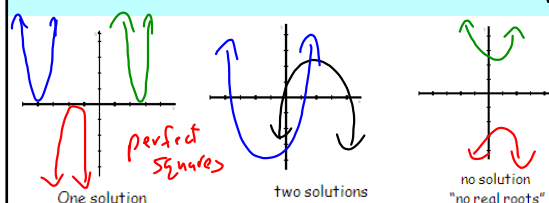
(6.4) Solving Quadratic Equations Using a Formula

Solution \longrightarrow roots, zeros
 \longrightarrow value of x when $y = 0$
 \longrightarrow x -intercepts

So far, to find the roots of a quadratic equation we have:

- 1) Put equation into standard form: $y = ax^2 + bx + c$
- 2) Rearrange to get $0 = \dots$
- 3) **FACTOR**
- 4) Set each factor $= 0$ and solve for the variable
- 5) **OR** Put in vertex form (complete the square) and solve by isolation

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BUT not all quadratic equations can be factored, and if not already in vertex form, then:

- 1) Put equation into standard form:
- 2) Rearrange to get $0 = \dots$
- 3) Use the **QUADRATIC FORMULA** to solve for x

QUADRATIC FORMULA

Using the Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

 $a \neq 0$ WHY????

$$b^2 - 4ac \geq 0$$

a value has to be positive

Quadratic Formula

Example 1: Solve the equation using the quadratic formula...i.e. find the roots.

$$5x^2 + 3x - 2 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Substitute in values for a, b, c .

(Note: you should always try to factor first. This equation does factor, however, we will use the formula to demonstrate the two different roots using easy numbers to work with.)

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Example 1: Solve the equation using the quadratic formula...i.e. find the roots.

$$-5x^2 + 3x - 2 = 0$$

(Note: you should always try to factor first. This equation does factor, however, we will use the formula to demonstrate the two different roots using easy numbers to work with.)

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Substitute in values for a, b, c.
 $a = +5$ $b = +3$ $c = -2$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-3 \pm \sqrt{3^2 - 4(5)(-2)}}{2(5)}$$

$$= \frac{-3 \pm \sqrt{9 + 40}}{10}$$

$$= \frac{-3 \pm \sqrt{49}}{10}$$

$$= \frac{-3 \pm 7}{10}$$

$\rightarrow \frac{-3+7}{10}, \frac{-3-7}{10}$
 $\frac{4}{10}, -\frac{10}{10}$
 $0.4, -2$
 $(0.4, 0) (-2, 0)$

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Example 2: Solve/find the roots of the quadratic equation

$$3x^2 - 6 = 4x + 6$$

a = _____
 b = _____ **watch your sign!
 c = _____

Put in standard form first:

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Example 2: Solve/find the roots of the quadratic equation

$$3x^2 - 6 = 4x + 6$$

a = _____
 b = _____ **watch your sign!
 c = _____

Put in standard form first:
 $3x^2 - 4x - 12 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(3)(-12)}}{2(3)}$$

$$= \frac{+4 \pm \sqrt{16 + 144}}{6}$$

$$= \frac{+4 \pm \sqrt{160}}{6}$$

$$= \frac{+4 \pm 12.6}{6}$$

$\frac{+4+12.6}{6}, \frac{+4-12.6}{6}$
 $\frac{16.6}{6}, -\frac{8.6}{6}$
 $(2.8, 0) (-1.4, 0)$

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Example 2: Solve/find the roots of the quadratic equation

$$3x^2 - 6 = 4x + 6$$

a = 3
 b = -4 **watch your sign!
 c = -12

Put in standard form first:
 $3x^2 - 4x - 12 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(3)(-12)}}{2(3)}$$

$$= \frac{+4 \pm \sqrt{16 + 144}}{6}$$

$$= \frac{+4 \pm \sqrt{160}}{6}$$

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$\frac{+4+12.6}{6}, \frac{+4-12.6}{6}$
 $\frac{16.6}{6}, -\frac{8.6}{6}$
 $2.8, -1.4$
 $(2.8, 0) (-1.4, 0)$

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Homework

Pg. 342 # 2a, 5ace, 7, 8→9ace, 10acd, 12→14

$$-1(-4.9x^2 + 12.2x - 0.6) = (0), -1$$

$$+4.9x^2 - 12.2x + 0.6 = 0$$

a = -4.9 a = 4.9
 b = +12.2 b = -12.2
 c = -0.6 c = +0.6

quad formula

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